#8

$A = \pi r^2$

$\frac{dr}{dt} = .01 \text{ cm/sec}$ when $r = 50$ cm

$\frac{dA}{dt} = ?$

$\frac{dA}{dt} = 2\pi r \cdot \frac{dr}{dt}$

$\frac{dA}{dt} = 2\pi \cdot 50_{cm} \cdot .01 \text{ cm/sec}$

$\frac{dA}{dt} = \pi \text{ cm}^2/\text{sec}$

$\frac{dl}{dt} = -2\,cm/sec$

$\frac{dw}{dt} = 2\,cm/sec$

when $l = 12\,cm$

$w = 5\,cm$

a.) $A = lw$

$\frac{dA}{dt} = l \cdot \frac{dw}{dt} + w \cdot \frac{dl}{dt}$

$\frac{dA}{dt} = 12 \cdot 2 + 5 \cdot (-2)$

$\frac{dA}{dt} = 14\,cm^2/sec$

b.)

$$P = 2l + 2w$$

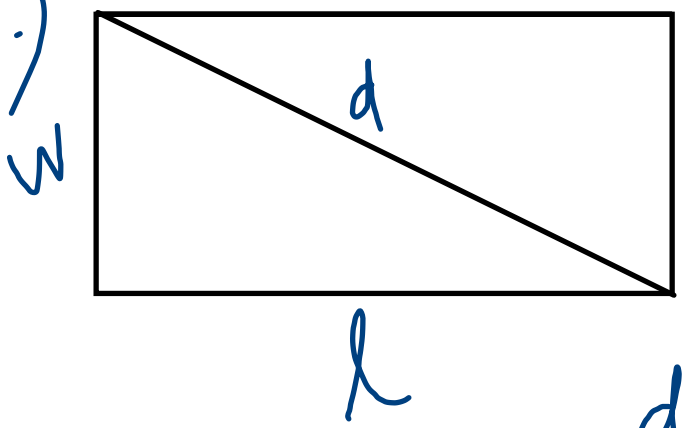
$$\frac{dP}{dt} = 2\frac{dl}{dt} + 2\frac{dw}{dt}$$

$$\frac{dP}{dt} = 2\cdot(-2) + 2\cdot 2 =$$

$$\frac{dP}{dt} = 0$$

The perimeter doesn't change.

c.)



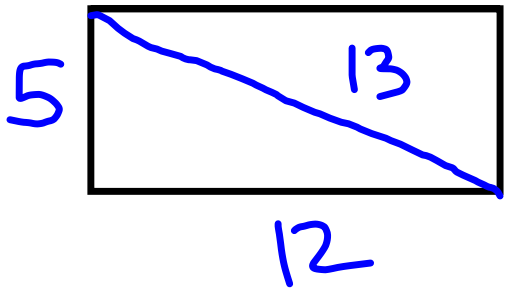
$$d^2 = w^2 + l^2$$

$$d = \sqrt{w^2 + l^2}$$

$$\frac{dd}{dt} = \frac{1}{2}\left(w^2 + l^2\right)^{-\frac{1}{2}}\left(2w \cdot \frac{dw}{dt} + 2l \cdot \frac{dl}{dt}\right)$$

$$\frac{dd}{dt} = \frac{1}{2}\left(25 + 144\right)^{-\frac{1}{2}}\left(2 \cdot 5 \cdot (2) + 2 \cdot (12) \cdot (-2)\right)$$

$$\frac{dd}{dt} = \frac{1}{2 \cdot 13}(-28) = -\frac{14}{13} \text{ cm/sec.}$$



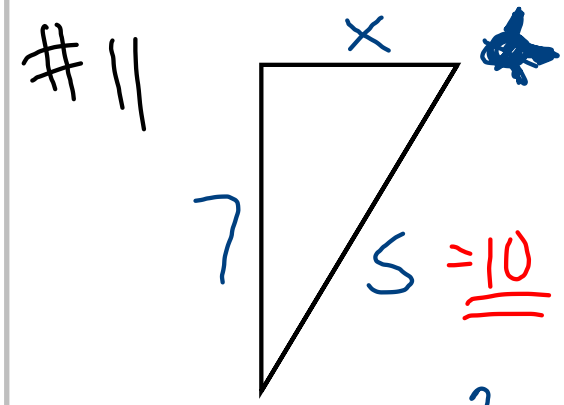
$$d^2 = w^2 + l^2$$

$$2d \cdot \frac{dd}{dt} = 2w \cdot \frac{dw}{dt} + 2l \cdot \frac{dl}{dt}$$

$$26 \frac{dd}{dt} = -28$$

$$\frac{dd}{dt} = \frac{-28}{26} = -14/13 \text{ cm/sec.}$$

#11



$\frac{ds}{dt} = 300$ mph

$s = 10$ $100 - 49 = x^2$ when $s = 10$ mi

$x = \sqrt{51}$

$\frac{dx}{dt} = ?$

$x^2 + 49 = s^2$

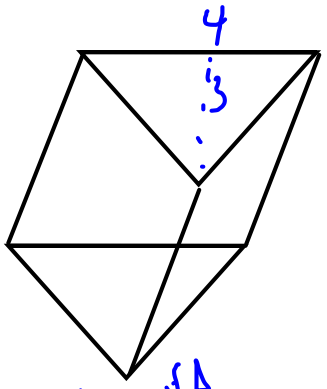
$2x \cdot \frac{dx}{dt} = 2s \cdot \frac{ds}{dt}$

$2 \cdot \sqrt{51} \frac{dx}{dt} = 2 \cdot 10 \cdot 300$

$\frac{dx}{dt} = 6000 / 2\sqrt{51} = 3000/\sqrt{51}$

$\frac{dx}{dt} \approx 420.1$ mph

#12



$\frac{dV}{dt} = 2.5\ cm^3/min$

$\frac{dh}{dt} = ?$ when $h = 2$

$b = 4, h = 3$

Area of Δ

$V = \frac{1}{2}bh \cdot h$

$V = \frac{1}{2}ba \cdot h$

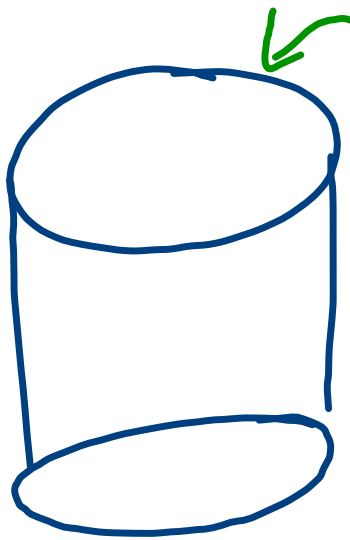
$V = 6h$

$V = \frac{15}{2}ba$ ①

$\frac{dV}{dt} = 6 \cdot \frac{dh}{dt}$

$\frac{dV}{dt} = \frac{15}{2}b \cdot \frac{da}{dt} + a \cdot \frac{15}{2}\frac{db}{dt}$

$2.5 = 6\frac{dh}{dt}$ $2.5/6$ cm/sec.



$V = \pi r^2 h$

π

area of circle

$V = Bh$

P. 238

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